OSTDS and Decentralized Systems Wastewater Treatment Program

PHASE II REPORT

Dr. Julie Harrington, Director

Ms. Jinjin Guo, Research Assistant

Center for Economic Forecasting and Analysis

The Florida State University

Innovation Park

2035 E. Paul Dirac Dr.

Suite 129 Morgan Bldg

Tallahassee Fl 32310

This report was funded in part, through a grant agreement from the Florida Department of Environmental Protection, Florida Coastal Management Program, by a grant provided by the Office of Ocean and Coastal Resource Management under the Coastal Zone Management Act of 1972, as amended, National Oceanic and Atmospheric Administration Award No. NA04NOS4190035. The views, statements, findings, conclusions and recommendations expressed herein are those of the authors and do not necessarily reflect the views of the State of Florida, NOAA or any of its sub agencies.

Revised January 2007

Contents

Figures

Tables

I. Introduction

This report will highlight Phase 2 of the project. As defined in the proposal, Task 2 involved working closely with the Wakulla County officials, staff, and the citizens advisory group and with the Wakulla County Health Department staff to develop a meaningful program for Wakulla County to use for directing the use of OSTDS and/or decentralized systems over the next several years. CEFA staffs were to provide facilitation expertise to guide the local community toward development of a working, sustainable program.[1]

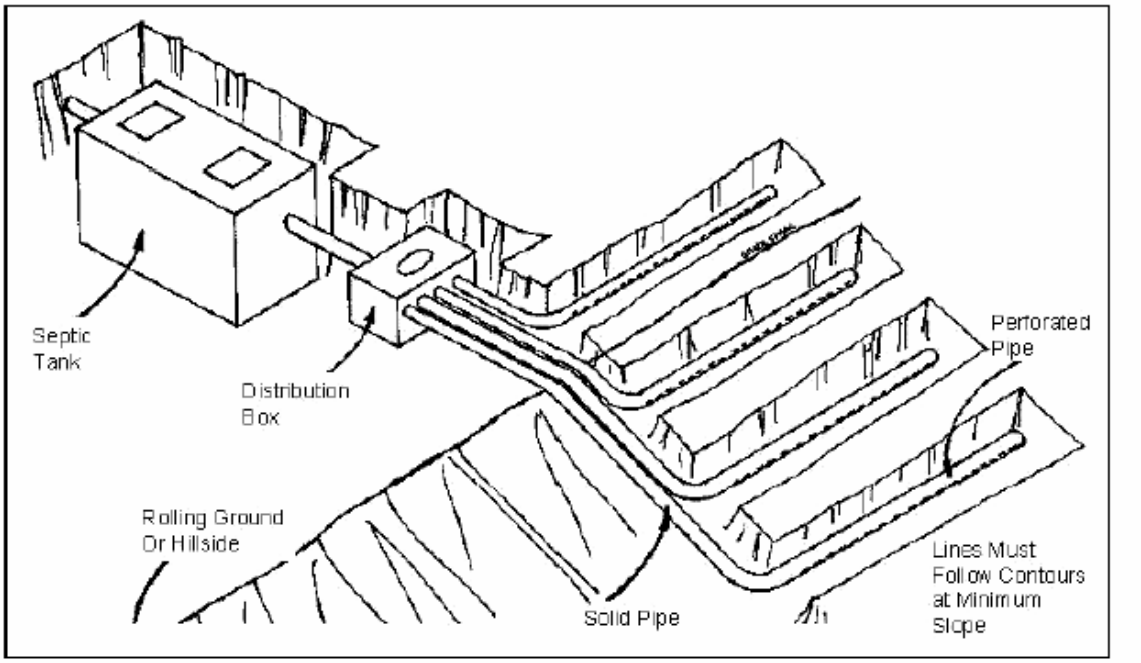
Phase 2 report will address the following areas of concerns:

- Treatment levels necessary to protect water supplies and ground and surface water quality
- Areas designated for central sewers for waste treatment at a plant or plants (These areas will not be of concern with respect to an OSTDS and decentralized wastewater management program.)
- Identify and justify areas for each treatment level for OSTDS and decentralized systems
- Determine management levels for existing developed areas on onsite sewage treatment and disposal systems (OSTDS) and for any planned areas of decentralized wastewater treatment
- Determine management entity or entities for existing and future development areas, based on treatment management schemes; address OSTDS users outside of development or community areas
- Technical options and financial options
- Education and outreach options
- Ordinance(s) required to accomplish goals set for OSTDS and decentralized systems use in Wakulla County, including any planning related regulations; assess need for possible Comprehensive Plan amendments.

The following figure provides a refresher for the reader as to the circumstances related to an onsite wastewater system.

[1] For more information, see: http://1000fof.org/FL_Panhandle_Initiative/SPRINGS/May2005Wakulla%20Results.asp

Figure 1. Conventional Onsite Wastewater System (OWTS)



Source: EPA, 2005. Figures

Table 1. Average Treatment Expectations for OWTS

	cBOD5 (mg/L)	TSS (mg/L)	TN (mg/L)	TP (mg/L)	System Type
Standard Septic system below drainfield at groundwater interface	<5	<5	25-40	<5	
Secondary Treatment	<20	<20			ATU
Advanced Secondary Treatment	<10	<10	<20	<10	PBTS
Florida Keys	<10	<10	<10	<1	PBTS
Advanced Wastewater Treatment	<5	<5	<3	<1	

Source: EPA, 2005. Tables

Table 2. Comprehensive Planning OWTS Program Elements

- Define management program boundaries.
- Select management entities.
- Establish human health and environmental protection goals.
- Form a planning team composed of management staff and local stakeholders.
- Identify internal and external planning resources and partners.
- Characterize and map past, current, and future development where OWTSs are necessary.
- Coordinate with local sewage authorities to identify current and future service areas and determine treatment plant capacity to accept septage.
- Identify documented problem areas and areas likely to be at risk in the future.
- Prioritize and target problem areas for action or future action.
- Develop performance requirement and strategies to deal with existing and possible problems.
- Implement strategy; monitor progress and modify strategy if necessary.

Source: USEPA Onsite Wastewater Treatment Systems Manual. Tables

II. Designated Sewer Areas

Evaluating a proposed area in terms of its environmental conditions (climate, geology, slopes, soils, landscape, ground water and surface water aspects), physical features (property lines, wells, hydrologic boundaries structures), and wastewater characteristics provides the information needed to size, select and site the appropriate wastewater treatment system.

Given the variable soil conditions in Wakulla County, there are three soil scenarios:

- Leon Series (sand) with SHWT 5" below ground surface and a spodic layer at 18-38" below ground surface. Without a soil replacement, the drainfield bottom will be at 24" above ground. The drainfield area, assuming slightly limited material, will be 300sqft.
- Shadeville series (sandy clay loam) with SHWT 42" below ground surface and limestone 45" below ground surface. The bottom of drainfield will be at 3 " below ground surface. The drainfield area, assuming moderately limiting material, will be 462sqft.

- Ortega series (fine sand) with SHWT at 42". The bottom of the drainfield can be at 18" below ground surface and the drainfield area will be 334sqft.

III. Treatment Levels

There are various treatment levels for the wastewater systems. They revolve around, primarily, the ability to determine the quality of the system. Thus, it is worth analyzing the various treatment technologies available for OSTDS.

Table 3. EPA Treatment Levels, 2006

Treatment Objective	Treatment Process	Treatment Methods
Suspended Solids Removal	Sedimentation	Septic tank
		Free water surface constructed wetland
		Vegetated submerged bed
		Lagoons
		Septic tank effluent screens
	Filtration	Packed bed media filters*
		Mechanical disc filters
		Soil infiltration
Solible Carbonaceous BOD and Ammonia Removal	Activated Sludge	Extended aeration
		Fixed film activated sludge
		Sequencing batch reactors
	Fixed Film Aerobic Bio-reactor	Soil infiltration
		Packed bed media filters*
		Trickling filter
		Fixed film activated sludge
		Rotating biological contactors
	Lagoons/Wetlands	Free water surface constructed wetland
Nitrogen Removal	Biological Nitrification/Denitrification	Activated sludge (nitrification only)
		Sequencing batch reactors (only if designed with certain operation modes)
		Fixed film bio-reactor (nitrification only)
		Recirculating media filter
		Fixed film activated sludge (nitrification only)
		Anaerobic upflow filter (denitrification only)
		Anaerobic submerged media reactor (denitrification)
		Submerged vegetated bed (denitrification)
		Free water surface constructed wetland
	Ion exchange	Cation exchange (ammonium)

		Anion exchange (nitrate)
Phosphorus Removal	Adsorption	Soil infiltration
		Iron-rich packed bed media filter
		Sequencing batch reactor (only if designed with certain operating modes)
Pathogen Removal (Bacteria, Viruses, and Parasites)	Filtration/Predation/Inactivation	Soil infiltration
		Packed bed media filters*
	Disinfection	Hypochlorite feed
		Ultraviolet light
Grease Removal	Flotation/Adsorption	Grease trap
		Septic tank
		Mechanical skimmer
	Aerobic Biological Treatment	All types

* Including dosed systems: granular [sand, gravel, glass], peat, textile foam.

Source: EPA, 2006. Tables

It should become increasingly clear that there are complexities involved with categorizing treatment levels. The septic systems produce numerous potentially harmful byproducts, including nitrogen. Therefore, it becomes vital to not only discuss better methods of treatment, but systems in general.

IV. Management Levels

Before beginning, it's important to understand the common causes of failure as it pertains to the onsite wastewater systems. When properly planned, they can be particularly effective. However, due to age and poor maintenance, they can prove to be as effective as a straight pipe. Below are some of the circumstances in which there could be failure.

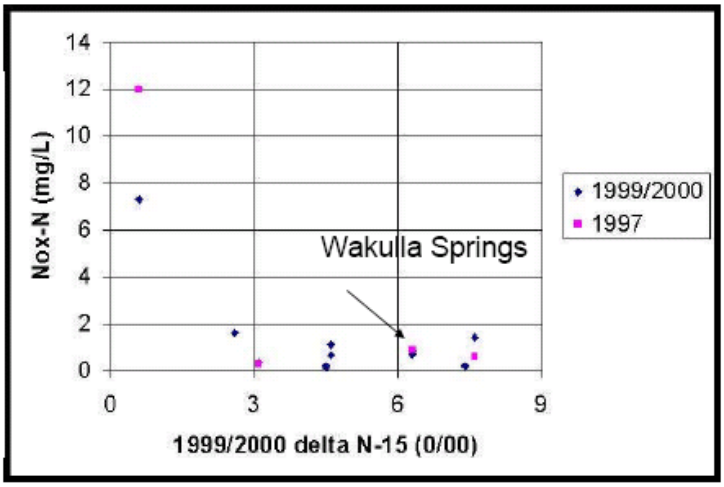
Table 4. Common Causes of Failures to Systems

Type of failure	Contributing causes
Hydraulic	Excessively hydraulic loadings to undersized systems, low soil permeability, excessive ponding at the infiltrative surface, poor maintenance. Increases in water usage overa period of years can exceed the design capacity of the wastewater treatment system.
Organic	Excessive organic loading from unpumped or sludge-filled tanks results in biomat loss of permeability (biomats are discussed further in Section 6 3.1.5.2, which describes subsurface wastewater infiltration systems).
Soil depth to ground water table or bedrock	Insufficient soil depths (I.e. soil thickness between the subsurface wastewater infiltration system [SWIS] and ground water tables, impermeable strata, or bedrock is less than the recommended depth for soil texture and structure). High ground water is deleterious to pathogen removal and hydraulic performance.
System age	Systems more than 25 to 30 years old. Systems less than 25 to 30 years old experience considerably fewer hydraulic failures. Failure rates can more than triple for older systems. Regular tank pumping and use of alternating SWISs can prolong system life indefinitely.
Design failure	Inappropriate system design for the site; failure to adequately consider or characterize wastewater strength and flow (average daily and/or peak flows); failure to identify and consider restrictive soil/rock layers (e.g. fragipan) or regional geology (e.g. karst features, creviced bedrock); failure to assess landscape position.
System density	Cumulative effluent load from all systems in watershed or ground water recharge area exceeds the hydrologic capacity of the area to accept and/or properly treat effluent.

Source: EPA . Tables

Figure 2. Nitrogen in the Wakulla Springshed

Delta N-15 as indicator of N-source in residential drinking water wells in the Wakulla Springs area
<3 artifical fertilizer
>10 animals/sewage



Source: Chellette, Pratt and Katz, 2002. Figures

In the Wakulla Springshed, nutrient contributions to groundwater (22% for TN) or possible pathogen indicator contributions to stormwater from failing systems. The vulnerability mapping and groundwater monitoring confirm priority areas for protection.

EPA Voluntary Management's 5 Suggested approaches:

- Homeowner Awareness
- Maintenance Contracts
- Operating Permits
- RME Operation and Maintenance
- RME Ownership/Management

The following table describes EPS Five Management Models (Levels).

Table 5. EPA Five Management Models

#	Model Name	Principles	Suitable Areas	Management Entities
Model 1 (Level 1)	Homeowner Awareness Model	The starting point for enhancing management programs. It provides communities with a good database of existing onsite wastewater treatment systems. To ensure that timely maintenance is performed, the regulatory authority mails maintenance reminders to owners at appropriate intervals.	Low environmental sensitivity.	Regulatory Authority; Local Service Provider; Developer; Site Evaluator; System Designer; Installer; System Owner; Pumper/Hauler.
Model 2 (Level 2)	The Maintenance Contract Model	Benefits of this level of management are that the risk of system malfunction is reduced and investments are protected. At this level of management, it is difficult to track and enforce, because it relies on the owner or contractor to report a lapse in a valid service and there is no mechanism to asses the effectiveness of the maintenance program.	This more advanced model is recommended where enhanced system designs be employed. Small systems and components.	Regulatory Authority; Local Service Provider; Developer; Site Evaluator; System Designer; Installer; System Owner; Pumper/Hauler; Operator
Model 3 (Level 3)	Operation Permits	This management level includes renewable and/or revocable operating permits issued to the system owner. These permits stipulate specific and measurable performance criteria for the treatment system and require the system owner to submit compliance reports periodically.	The minimum model used where large-capacity systems or systems treating high-strength wastewaters are present.	Regulatory Authority; Local Service Provider; Developer; Site Evaluator; System Designer; Installer; System Owner; Pumper/Hauler; Operator; Inspector.
Model 4 (Level 4)	Responsible Management Entity (RME) Operations and Maintenance	This model grants operating permits to RME organizations. The RME is then responsible for timely and concise operation and maintenance of OWTS. While operation and maintenance is a responsibility of the RME, the homeowner owns the OWTS and is responsible for any repair or replacement costs.	This is appropriate for areas of moderately high environmental sensitivity or with large concentrations of OWTS. Particularly, this management level is applicable for developments that utilize clustered OWTS technology.	Regulatory Authority; Local Service Provider; Developer; Installer; System Owner; Pumper/Hauler; Operator; Inspector; RME.
Model 5 (Level 5)	Responsible Management Entity (RME) Ownership Model	Providing the greatest assurance of system performance in the most sensitive of environments, this model specifies that RME owns, operates and maintains the system, removing the property owner from responsibility for the system. The objective of this model is to provide professional management of the planning, siting, design, construction, operation and maintenance of onsite or decentralized systems.	This management level is ideal for very sensitive areas and clustered systems that require a high level of monitoring and maintenance.	Regulatory Authority; Local Service Provider; Developer; Site Evaluator; System Designer; Installer; System Owner; Pumper/Hauler; Operator; User; RME.

Source: EPA. Tables

With concern to Florida's management practices, the following table shows three main levels of Florida's wastewater treatment:

Table 6. Florida's Management Practices

Types of System	Practices
Standard Septic System	Homeowner education
	Design and construction (water table separation, soil textures) standards
	Missing: regular inspection and maintenance requirement
Aerobic treatment units	Units third-party tested to meet performance criteria
	Operating permit requires homeowner contract with qualified maintenance entity
	Regular inspection required
Performance-based treatment systems	Engineer-designed and in most cases third party tested
	Operating permit requires homeowner contract with qualified maintenance entity
	Regular inspection and sampling required

Source: EPA. Tables

Domestic wastewater contains several kinds of pollutants; the major pollutant is the pathogens (disease-causing microorganisms) like the bacteria and viruses that cause dysentery, hepatitis, and typhoid fever. When nutrients such as nitrogen and phosphorus are discharged from septic systems into groundwater, they can contaminate drinking water supply, and also represent a potentially important nonpoint source of pollution to ponds, streams, and estuaries. The following table shows the main types of pollutants of concern for OWTS.

Table 7. Pollutants of Concern for OWTSs

Pollutant	Reason for concern
Pathogens	Microorganisms such as parasites, bacteria, and viruses can cause communicable diseases through direct/indirect body contact or ingestion of contaminated water or shellfish. Pathogens pose a particular threat when partially treated sewage pools on ground surfaces or migrates to recreational waters. Transport distances for some pathogens in surface or ground waters can be significant.
Nitrogen	Nitrogen is a plant nutrient that can contribute to eutrophication and depletion of dissolved oxygen in surface waters, especially in estuaries and coastal embayments. Excessive nitrate-nitrogen in drinking water can cause methemoglobinemia in infants and complications for pregnant women. Livestock also can suffer health impacts from drinking water high in nitrate.
Phosphorus	Phosphrus is a plant nutrient that can contribute to eutrophication of inland fresh waters and some marine waters and eventually deplete dissolved oxygen.

Household chemicals	Chlorine, ammonia, and other cleaning compounds in high volumes may disrupt or disable biological activity in the septic tank. Waters from hobby or craft activities (paints, solvents, etc.) and disposal of non-organic liquid wastes (old furniture polish, pesticides/herbicides, etc) in onsite/cluster systems can have similar impacts.
Pharmaceuticals and endocrine disruptors	Disposal of large quantities of outdated antibiotics and other medicinal products in septic tank-based systems can impair or halt biological treatment processes. Disposal of products containing chemicals that disrupt endocrine system functions (e.g. regulation of metabolism, blood sugar, reproduction, embryonic development) in on-site systems might result in leaching of these chemicals into ground water and surface waters and impair water quality and/or aquatic organisms, in some cases. Research on this issue, including toxicology, transport, and fate of potential endocrine disruptors, is ongoing (USEPA, 1998a; North Carolina Department Environment and Natural Resources, no date).

Source: EPA . Tables

Table 8. Leading Pollutants and Sources* Causing Impairment in Assessed Rivers, Lakes, and Estuaries

	Rivers and Streams	Lakes, Ponds, and Reservoirs	Estuaries
Pollutants	Siltation	Nutrients	Pathogens (Bacteria)
	Pathogens (Bacteria)	Metals	Organic Enrichment/ Low Dissolved Oxygen
	Nutrients	Siltation	Metals
Sources	Agriculture	Agriculture	Municipal Point Sources
	Hydromodification	Hydromodification	Urban Runoff/Storm Sewers
	Urban Runoff/Storm Sewers	Urban Runoff/Storm Sewers	Atmospheric Deposition

*Excluding unknown, natural, and "other" sources.

Source: EPA, Tables

Table 9. Site features that should be evaluated before OWTS design and installation

Type	Site Feature
Surface Features	Location of property boundaries, location of existing and/or proposal structures, location of surface water features (landscape position and land form, including intermittent and perennial drainage ways, irrigation ditches, streams, swales, depressions, water bodies, and wetlands), topography (use local regulatory suitability criteria or Natural Resources Conservation Service [NRCS] soil survey classes), location of water supply sources (well, public water supply reservoir), location of buried anthropogenic features (water lines, utility lines, etc.), location of disturbed soil (cut and fill), other significant features (large trees, bedrock ant surface, etc)
Soil Features	Major soil horizons, texture and structure of each horizon, color, mottles, other relevant features of each horizon (rupture resistance, penetration resistance, wetness, pore characteristics, presence of roots), depth to bedrock, depth to low permeability (i.e., restrictive) soil horizons (frangipani, caliches, duripan, etc.), depth and thickness of strong textural contrasts. Phosphorus (P) Index when P retention is needed.

Hydrogeologic Features	Depth to seasonal high water table and shallow ground water tables, potentiometric surface, ground water flow direction and gradient, percolation test results, saturated hydraulic conductivity (estimated, field, and laboratory), ground water time of travel to points of interest, unsaturated hydraulic conductivity relationships, other water budget parameters (precipitation, potential evapotranspiration, etc.).

Source: EPA. Tables

Table 10. Practices to characterize surface and subsurface features of proposed OWTS sites (ASTM, 1995, 1996b)

Description of activity	Information from research
Preliminary Documentation	Site survey map
	Soil survey, US Geological Survey (USGS) topographic map
	Aerial photos, wetland map
	Natural resource inventories
	Applicable regulations and/or setbacks
	Hydraulic loading rates
	Criteria for alternative OWTSs
	Size of house or facility
	Loading rates, discharge types
	Planned location of water well
Scheduling	Planned construction schedule
	Date and time for meeting
Description of Activity	Information from field study
Identification of Unsuitable Areas	Water supply separation distances
	Regulatory buffer zones and setbacks
	Limiting physiographic features
Subsurface Investigations	Ground water depth from pit or auger
	Soil profile from backhoe pit
	Percolation tests
Identification of Recommended OWTS Site	Integration of all collected data
	Identification of preferred areas
	Assessment of gravity-based flow
	Final selection of OWTS site

Source: EPA. Tables

V. Management Entities

Developing, implementing, and sustaining a management program requires knowledge of the political, cultural, and economic context of the community, the current institutional structure, and available technologies. Also required are clearly defined environmental and public health goals and adequate funding. A management program should be based on the administrative, regulatory, and operational capacity of the management entity and the goals of the community. In many localities, partnerships with other entities in the management area (watershed, county, region, state, or tribal lands) are necessary to increase the capacity of the management program and ensure that treatment systems do not adversely affect human health or water resources. The main types of management entities are federal, state, and tribal agencies; local government agencies; special-purpose districts and public utilities; and privately owned and operated management entities. Descriptions of the various types of management entities are provided in the following table.

Table 11. Management entities involved in every management level (model)

	State Agency	County	Municipality	Special District	Improvement District	Public Authority	Public Nonprofit Corporation	Private Nonprofit Corporation	Private for-profit Corporation
Responsibility	Enforcement of state laws and regulations	Enforcement of state codes, county ordinances	Enforcement of municipal ordinances; might enforce state/county codes	Powers defined; might include code enforcement	State statutes define extent of authority	Fulfilling duties specified in enabling instrument	Role specified in articles of incorporation	Role specified in articles of incorporation	Role specified in articles of incorporation
Financing Capabilities	Usually funded through appropriations and grants	Able to charge fees, assess property, levy taxes, issue bonds, appropriate general funds	Able to charge fees, assess property, levy taxes, issue bones, appropriate general funds	Able to charge fees, assess property, levy taxes, issue bonds	Can apply special property assessments, user charges, other fees; can sell bonds	Can issue revenue bonds, charge user and other fees	Can charge fees, sell stock, issue bonds, accept grants and loans	Can charge user fees, accept grants/loans	Can charge user fees, accept grants/loans
Advantages	Authority level and code enforceability are high; programs can be standardized; scale efficiencies	Authority level and code enforceability are high; programs can be tailored to local conditions	Authority level and code enforceability are high; programs can be tailored to local conditions	Flexible; renders equitable service	Can extend public services without major expenditures; service recipients usually supportive	Can provide service when government unable to do so; autonomous flexible	Can provide service when government unable to do so; autonomous, flexible	Can provide service when government unable to do so; autonomous, flexible	Can provide service when government unable to do so; autonomous, flexible
Disadvantages	Sometimes too remote; not sensitive to local needs and issues; often leaves enforcement up to local entities	Sometimes unwilling to provide service, conduct enforcement; debt limits could be restrictive	Might lack administrative, financial, other resources; enforcement might be lax	Can promote proliferation of local government, duplication/fragmentation of public services	Contributes to fragmentation of government services; can result in administrative delays	Financing ability limited to revenue bonds; local government must cover debt	Local governments might be reluctant to apply this concept	Services could be of poor quality or could be terminated	No enforcement power; company might not be fiscally viable; not eligible for major grant/loan programs

Source: USEPA Onsite Wastewater Treatment Systems Manual. Tables

Table 12. Twelve problems that can affect OWTS management programs

1. Failure to adequately consider site-specific environmental conditions (site evaluation)
2. Codes that thwart system selection or adaptation to difficult local site conditions and that do not allow the use of effective innovative or alternative technologies.
3. Ineffective or nonexistent public education and training program
4. Failure to include water conservation and reuse
5. Ineffective controls on operation and maintenance of systems
6. Lack of Control over residuals management
7. Lack of OWTS program monitoring and evaluation, including OWTS inspection and monitoring
8. Failure to consider to special characteristics and requirements of commercial, industrial, and large residential systems
9. Weak compliance and enforcement programs
10. Lack of adequate funding
11. Lack of adequate legal authority
12. Lack of adequately trained and experienced personnel

Source: NSFC, 1996. Tables

VI. Management Options

The costs of managing onsite wastewater treatment systems are mostly determined by the local soil conditions and the corresponding types of wastewater treatment technologies used. In areas with deep, permeable soils, septic tank-soil absorption systems can be used. In areas with shallow soils to a limiting condition, very slowly permeable soils, or very highly permeable soils (such as sand), more complicated onsite systems will be required. The cost of management is directly related to soil limitations and the complexity of the necessary treatment technology. That is, as the septic systems become more complicated, so do the management programs. Most of the costs come from the salary and benefits provided for the operator. All systems will require periodic septic tank pumping and for some systems worn out pumps and other parts must be repaired or replaced. A study in North Carolina found that the lack of a maintenance program was a major cause of poor system performance for about 40 percent of the alternative systems studied. North Carolina has also adopted in its' state rules, the requirement that

certain types of septic systems must be maintained in the future by a "management entity" (a formal organization that performs the maintenance tasks), with oversight by the local health department.

As discussed in the Task I report and as outlined in the "Ordinances" section of this report, Wakulla County recently adopted a "water quality ordinance" that requires performance based systems to be installed in all new development and for those "failing systems" needing repairs.

For this section, based on CEFA's research into the area, there are a number of suitable options that could be considered in the future. The options can be separated into three categories of management: direct management by a public agency, management by a special governmental unit, and management by a private party. The following lists the seven options that CEFA finds would be most feasible in Wakulla County:

1) The "do nothing option": This would involve the Wakulla County Health Department oversight as allowed for in the current DOH regulations. As new developments are built in Wakulla County, they will be required to install the state approved performance-based systems. Current septic systems that fail or need to be repaired will be required to replace their failing system with a performance-based system. The Wakulla County Department of Health will exist at current staff load levels and continue to struggle with the additional resources required to manage the performance-based systems. Individual homeowners will be responsible for contracting with certified OSTDS operators and professional engineer, for inspection requirements, and for maintenance of their new performance-based systems.

2) County Health Department oversight of OSTDS maintenance (greater than the DOH regulations currently require): This would involve additional financial support for expanding Wakulla County Department of Health staff. The 2006 end of year projections for new septic systems are currently at 534, and repairs are projected to be 86 totaling 620 systems. As illustrated in the Wakulla County workload spreadsheets in Table 13, are the current person power (Full Time Equivalent) required for the combined systems (current workload needs plus new workload requirements). According to the new water quality ordinance recently passed in Wakulla County, and based on a work load analysis performed by Wakulla County DOH, there will be a need for at least two new field staff and one supervisor/support person to handle the additional workload requirements.

Table 13. DOH Workload Unit and Staffing Demand for the OSTDS Program in Wakulla County[2]

ONSITE SEWAGE TREATMENT AND DISPOSAL SYSTEM PROGRAM

Routine Activities

61	Sys App New	1500	620	1	620	2.75	2.75	1705	0.63
61	Permits Aband	1500	0	1	0	1.65	1.65	0	0.00
61	Sys App Existing	1500	0	1	0	2.20	2.20	0	0.00
61	Permits Repair	1500	0	1	0	2.75	2.75	0	0.00
61	Septic Manu	1500	0	2	0	3.30	3.30	0	0.00
61	Pump Out Vehicle	1500	0	2	0	4.40	4.40	0	0.00
61	Sept Stab Facilities	1500	0	1	0	3.30	3.30	0	0.00
61	Sept Dis Sites	1500	0	1	0	4.40	4.40	0	0.00
61	OP Perm IM Zone	1500	0	1	0	2.20	2.20	0	0.00
61	OP Perm ATU	1500	0	2	0	1.65	1.65	0	0.00
61	OP Perm Commercial	1500	0	1	0	1.65	1.65	0	0.00
61	OP Perm PBTS	1500	620	2	1240	1.65	1.65	2046	0.76
	Routine Total		1240		1860			3751	1.39

Other Activities

	Sample Collection	1800	0	1	0	1.10	1.10	0	0.00
	Reinspection	2000	1860	0.14	260	2.20	2.20	573	0.21
	Investigation	2500	1240	0.06	223	2.20	2.20	491	0.18
	App Plan Review	3100		1.00	0	1.65	1.65	0	0.00
	Variance Process	3100	0	1	0	2.20	2.20	0	0.00
	Site Eval New	3210	0	1	0	2.20	2.20	0	0.00
	Site Eval Repair	3210	0	1	0	3.30	3.30	0	0.00
	Enforcement Action	3500	1240	0.10	186	2.20	2.20	409	0.15
	Other Total				670			1473	0.54
Field Staff			1240		2530			5224	2.12
Supervision/Support									1.06
OSTDS Program Total									3.19

This program area u: the Statewide Averages WLU values

Tables

3) County or City Management Utility for OSTDS: City or County may levy property taxes, set fees, rates, charges and penalties; condemn land, impose special assessments; issue general obligation and revenue bonds; and establish rules and regulations. There is an established governing body. Many counties and cities already have a wastewater management services in existence. However, this is not the case with Wakulla County, the Wakulla County utility currently services water

[2] Figures provided by Mr. Padraic Juarez, MS, Environmental Administrator Wakulla County Health Department

and outsources the sewer management functions. As of October 2006, Wakulla County is moving to handle the sewer management.

4) County Management Utility for all Wastewater (Sewer and OSTDS) and or a County Management Utility for all Water and Wastewater. Similar to point 3 however, now including water and sewer, in addition to OSTDS functions.

5) "Special District" Utility[3] for all OSTDS or Special District Utility for all wastewater (OSTDS and sewer). A special district can involve a county OR a region OR a defined geographical area. Special districts provide specialized governmental services. They have the following characteristics[4]:

    - The have a governing board with policy-making powers
    - They operate within a limited geographical area.
    - They are usually created by general law, special act, local ordinance, interlocal agreement, or by rule of the Governor and Cabinet. Within 30 days after the first meeting of its governing board, one would designate a registered office and a registered agent and file such information with the Special District Information Program. There is a $175 annual fee to be paid to the Department of Community Affairs to pay the costs of administering the Special District Information Program.

There are a number of water and sewer special districts that have been created in Florida; including Suwannee, Taylor, Clay, Collier, Osceola, South Seminole and North Orange, Walton/Okaloosa/Santa Rosa counties. There are also a handful of other water and sewer that comprise cities, and areas that are active in Florida. Some names include: Sanitary District, Water and Sewer District, Public Works Authority, Utility Authority, Environmental Control, Wastewater Transmission, and Regional Utility Authority.

There are two types of special districts; dependent and independent. Most comprise an average of five Board members that are elected, although a few special districts appoint members, and one special district's Board is Governor-appointed. Some advantages of special districts are that they

---

[3] Chapter 189 F.S.

[4] http://www.floridaspecialdistricts.org/FAQ.cfm

become eligible for public funding; i.e., state revolving funds, and grants funding, etc. and that having two units (or more) of government allows more flexibility in terms of sharing financing and policy making while maintaining the advantages of a single management entity.

6) Private Entity: May be operated for profit or as a non-profit, established under general law. There are two types of private entities; regulated public utilities and certified wastewater system operators. For profit corporations are not usually considered for state or federal grants. They can, however, perform public functions under contracts with a public agency in many cases. For example, a county could contract with a private for-profit or non-profit company to manage small wastewater facilities. Or, the contract could state that the private entity provides the facilities and maintains and operates them. The financial base would be established from the user fees and charges plus additional support from the county under the contract for services. They do not have strong enforcement capabilities if operated as a non-profit, and do not require homeowners to hook up to sewer if sewer is available.

7) Government Utility Authority (GUA)[5] created by interlocal agreement: created by governmental units, usually cities and counties, and governed by a Board appointed by those units. An authority does not have general taxing authority, and may not issue general obligation bonds however, may issue revenue bonds. It may extend over several jurisdictions or portions of jurisdictions. Its financing powers are extensive and include the authority to levy special assessments for improvements. Currently, there are GUA management entities being discussed and created in the Wakulla County area; namely, Franklin County is exploring this option, and Steinhatchee Water and Sewer Utility (a private non-profit) is currently converting to a GUA including water and sewer. In addition, the Steinhatchee GUA will have a construction arm that includes a licensed contractor on staff, staff to work the pipeline (for water and sewer) and will subcontract out the remainder of work.

[5] 163.01(7)(g)1, F.S.

What is the Most Suitable OSTDS Management Entity for Wakulla County?

The selection of a suitable management entity depends on the maintenance needs of the septic system. Research and public discussion are integral to the management selection process. Technical, legal, and financial advice should be tapped early to assess the options. Factors to consider in the selection of a management entity include:

- The ability to provide policy and management continuity;
- The ability to charge fees for service;
- The ability to compel users of the services to comply with the requirements of the management plan (e.g., service, and inspection);
- The capacity for maintaining adequate financial responsibility
- The ability to shift liability (some management entities focus all liability in one organization, while others distribute liability among organizations);
- The ability to hire and retain adequately qualified employees;[6]
- The ability to provide adequate enforcement for septic systems requirements.

Members of the public who should be educated about and involved in wastewater management and decision making processes include homeowners, public officials, developers and real estate professionals, scientists, and the business community.

The process of creating a wastewater management system can begin with the local health department or the citizens with the most vested interest. It will involve an increased cost, however, the monthly (or assessed annual cost) is comparable to a sewer user fee. There are numerous billing options that might include: monthly, annually, annually assessed on the property tax bill, or possibly included in the escrow portion of a mortgage payment, among other options. One example of a funding arrangement is outlined in Table 14 and might include: [7]

---

[6] Excerpted from "Management of Single Family and Small Community Wastewater Treatment and Disposal Systems", published by the North Carolina Cooperative Extension Service

[7] Funding arrangement design developed by Ms. Patricia Sanzone, Florida Department of Environmental Protection, and Dr. Julie Harrington, CEFA, Florida State University

Table 14. Option of a County-wide or Special District Utility for all OSTDS

		Period	01/1/07 - 12/31/07
Item	**Number**	**Annual Cost**	**Total**
Revenues* ($20.42/home/month)	9,476	$245	$2,321,620
Expenses			
Repairs per Year	100	$7,500/OSTDS	$750,000
Field Staff	4	$60,000	$240,000
Data Person	1	$65,000	$65,000
Administration	1	$80,000	$80,000
Subtotal Salaries			$385,000
Pump outs per year	2,000	$300	$600,000
Overhead (utilities etc.)*			$46,200
Total Expenses			$1,781,200
Grand Total (Net revenues - expenses)^			$540,420

*** Based on existing septic permit records in Wakulla County from 1979 - 2005**
****Overhead includes maintenance, electric and other utilities...estimated 12% of total**

Tables

Goal: Protection and Improvements to Ground and Surface Waters in Wakulla County.

Current Objective: Nitrate reductions from onsite sewage treatment and disposal systems (OSTDS) throughout the entire county.

Assumptions: All new OSTDS must be performance-based treatment systems (PBTS) paid for my developers or property owners, including initial operating permit fees and maintenance contracts for two years.

Management entity is a special district or other legal governmental body that can receive government financial assistance when needed for low or moderate income property owners or residents; management entity is not part of the Department of Health (DOH) so as to allow checks and balances, to not overburden the local county health department nor to detract from overall responsibilities.

Revenue: Charge all OSTDS owners $245/year fee (~$20.42/month).

Alternative: Charge all OSTDS owners $20/year fee and charge all undeveloped lot owners $10/year. 9,476 OSTDS x $245 = $2.32 million (collect as part of county tax bill or assess through a new collection system)

Expenses: As follows:

Staffing Costs (include fringe benefits):

Program Administrator	$ 80,000
Field Staff (four initially)	$240,000
Clerical/Database Maintenance Staff (one)	$ 65,000
Total Staffing	$385,000

Administrative responsibilities: Manage office and staff; hiring; manage monies and budget; assure PBTS prioritization is done; assigning work to private sector/maintaining contracts for this work; etc.

Field staff responsibilities: Oversight of pumpouts with accompanying structural inspection to be done by staff or oversee that done by private sector; perform any sanitary surveys needed to prioritize systems replacements (if not done by Wakulla County HD); routine, frequent PBTS operating checks; system monitoring if not contracted out; etc.[8]

Clerical/Database Maintenance staff responsibilities: Clerical needs; database maintenance; noticing staff of red flags for weeks and months; etc.

Pumpouts: (1/5 of all OSTDS/year; private sector work; divided equally between all service providers in area that are DOH certified and who will perform the work at the prices set for pumpouts): 2,000 (initially) x $300 = $600,000;

PBTS installations: (goal of replacing 100/year or maximum expenditure of $750,000/year, whichever comes first): Prioritize replacements; begin each year with 10-15 high priority replacements (consider sewering if at all possible); rest of year replace systems that cannot or should not be repaired based on Wakulla County HD recommendations; at the end of the year assess PBTS replacement funds & spend out remainder of funding (net revenues minus expenses) on highest priorities.

Administrative fees (Overhead): (12% of salaries; will include building costs, phone & Internet costs, office & field equipment, insurance, legal fees for enforcement, etc.; and other costs): $385,000 x 12% = $46,200

Remainder of funds = $540,420= Funds for maintenance agreements for PBTS installed by management entity and for all repairs other than those covered by first two years of new PBTS purchased by system owners; "repairs" may be modification of systems, clustering or otherwise changing

[8] These staff should be as qualified as the health department inspectors.

the existing systems or systems to better perform, or possibly connecting to a sewer system if one is reasonably available; residuals management system; monitoring of random systems for nitrates removal (estimates = [(annual maintenance agreements) $200 x 190 PBTS = $38,000] + [(annual repair costs) $400 x 190 PBTS = $76,000] + [(OSTDS "repairs") $1,000 x 190 = $190,000] + [(residuals management system debt service) $1,000,000 over 5 years + 4% interest = $200,000] + [(residuals disposal) 2,000 units pumped x 500 gals. X $50/2,000 gals. tipping fee = $25,000] + [(monitoring) 190 units annually x $50/unit = $9,500] =$538,500

Any funds not expended in year will be put into the PBTS replacement funds at beginning of next fiscal year. If program has replaced all OSTDS and is self-supporting, excess funds will be donated for other county water improvement/preservation projects.

Financial Summary: Revenues ($2,321,620)–Expenses ($1,781,200)= $540,420 net.

Net Remaining: (see above for remaining outlay) = $1,920

VII. Financial Options

The price information outlined below is estimated based on a new three-bedroom house in Crawfordville (Wakulla County) Area (Provided by Bureau of Onsite Sewage Programs), with a design daily flow of 300 gallons, and assumed that access, horizontal set back distances, authorized flow etc. could be met. Prices for the installation of two types of systems are provided:

- Conventional systems as a point of comparison
- Performance-based treatment systems that meet advanced secondary wastewater treatment standards (CBOD5=10/TSS=10/TN=20/ TP=10), and a stricter nitrogen standard of TN=10 mg/L. Up to 30% reduction in drainfield size was allowed (F.A.C. 64E-6.028 (3)(j)), provided that surge storage requirements were met.

This following table shows the summarized information of estimated prices for sewage systems. Information includes materials, labor and equipment, permitting and the maintenance agreement for the first two years. [9]

[9] Price List Memo provided by Mr. Richard Deadman, Division of Community Planning, Department of Community Affairs as of Feb. 21, 2006. The companies provided this information were in alphabetical order (equipment

Table 15. Price Estimates for PBTS.

	Drainfield bottom elevation relative to ground surface	Conventional drainfield area (sqft)	PBTS-cost (advanced secondary TN=10 mg/L)	Conventional system cost
Dosed system (low-pressure or drip irrigation)	24" above	300	$11,275 (drip) $11,350 (low pressure)	$8,150 (drip) $7,850 (low pressure)
Dosed system (low-pressure or drip irrigation)	3" below	462	$10,875 (drip) $8,800 (low pressure)	$6,000 (drip) $5,300 (low pressure)
Dosed system (low-pressure or drip irrigation)	18" below	334	$10,575 (drip) $7,060 (low pressure)	$3,800 (drip) $3,560 (low pressure)
Gravity system	18" below	334	$7,253 $5,375	$2,100 $1,875

Tables

Several approaches are being used around the U.S., involving funding collection necessary to maintain an onsite wastewater management system. While no single financing approach is ideal, the choice must be matched with the desires of the community and its leaders, to ensure adequate funds to sustain a viable management system.

There are several such options:

- **Increased taxes:** Taxes may be used as a limited funding source for wastewater systems costs. Options include income taxes, sales taxes and property taxes. The benefits and limitations of these three taxes funding resources are listed in the following table:

manufacturer in parentheses): Apalachee Backhoe and Septic Tank (Hoot) and Talquin Septic (Biomicrobics). The prices could be decreased by 5-25 percent if multiple lots were permitted and installed at the same time. Additional savings could be obtained by clustering houses onto a central system. Some older systems meeting current setbacks from surface water and separation from the seasonal high water table could possibly be retrofitted with a treatment to provide nitrogen reduction.

Table 16. Benefits and limitations of increased taxes for funding

Tax Type	Benefits	Limitations
Income taxes	Income taxes provide a stable source of revenues	State government generally controls the level of taxed that local governments may levy
	Using income taxes to pay for annual system costs may lessen the user fee burden on lower-income households	Most often, it is politically difficult to raise taxes and/or to earmark taxed for water pollution controls
		With taxes, there is no direct link between service provided and revenue source.
Sales taxes	Sales taxes can be targeted to products that contribute to water pollution	Due to strain on local governments, the competition for revenues from sales taxes is strong
	Revenue base can be broad, so a small tax can collect a significant amount of revenue	
	Purchasers of products who do not reside in the service area help pay for impacts of the products they purchase	Many communities already use the maximum allowable sales tax rate
Property taxes	Local government have control over the use and level of property taxes	Many communities have encountered substantial resistance to increased property taxes
	A portion of the property tax revenues may be dedicated to wastewater treatment control	State-wide limitations on increases of property taxes or property tax levels restrict the use of property taxes for additional services.
		Using property taxes to fund wastewater system cost doesn't provide the direct link between services and costs as does a user charge system based on water usage and type of discharge

Source: CSO Funding Options. Tables

- **Government funding**: Government funding includes low interest bonds and grants. There are several options of government funding resources:

Table 17. Government funding resources

Program	Type of Assistance	Provider
DWSRF	Low-interest loans or other assistance to public water systems	Environmental Protection Agency (EPA)
CWSRF	Low-interest loans or other assistance to public wastewater systems and nonpoint source pollution control and estuary management projects	Environmental Protection Agency (EPA)
RUS	Grants and loan programs for development of safe and affordable water supply systems, sewage systems and other waste disposal facilities	United States Department of Agriculture (USDA)
CDBGs	Block grants for drinking water and wastewater infrastructure improvements	US Department of Housing and Urban Development
EDA	Grants for drinking water and wastewater infrastructure projects	Economic Development Administration (EDA)
Construction Grants for Wastewater treatment Works	Project Grants	Federal Agency, Office of Water, Environmental Protection Agency
Environmental Protection Consolidated Grants-Program Support	Project Grants	Federal Agency, Regions 1 and 2, Office of Administrator, Environmental Protection Agency
Water Pollution Control State, Interstate, and Tribal Program Support	Formula Grants	Federal Agency, Office of Water, Environmental Protection Agency
National Integrated Water Quality Program - Conservation Effects Assessment Project (CEAP)	Grant	United States Department of Agriculture (USDA)
Water Projects Grant Program	Grant	Florida Department of Environmental Protection
Small Cities Community Development Block Grant (CDBG) Program	Grant	Department of Community Affairs
The Clean Water State Revolving Fund (SRF)	Low interest loans	Florida Department of Environmental Protection
The Drinking Water State Revolving Fund (SRF) Program	Low interest loans and Grants	Drinking Water State Revolving Fund
Economic Development Administration (EDA) Public Works and Development Facilities Program	Infrastructure investments	US Department of Commerce
Rural Infrastructure Fund	Financial Assistant for other infrastructure investments	Enterprise Florida
Rural Community Development Revolving Loan Program	Loan/Loan guaranty	Enterprise Florida

Table 18. Government funding resources (Continued).

Florida Rural Water Association Loan Program	Interim construction loan	Florida Rural Water Association
Capacity Building Grants	Grants	Environmental Protection Agency (EPA)
Project Implementation Grants	Grants	Environmental Protection Agency (EPA)
A WVU-based center helps solve water problems around the nation.	Grants	NESC's four federally funded programs: the National Small Flows Clearinghouse, National Drinking Water Clearinghouse, National Environmental Training Center for Small Communities, and National Onsite Demonstration Program.
Rural Development Housing & Community Facilities Programs	Grants	USDA
The Florida Coastal Management Program (FCMP)	Grants	National Oceanic and Atmospheric Administration (NOAA)

Tables

One good possibility for Wakulla County would be the clean water state revolving fund, administered through the Florida Department of Environmental Protection, which could be a zero-to-low-interest source of funding for the wastewater systems. If a regional management entity were established, this type of public financing would be available. This would take a considerate amount of commitment and spirit of cooperation from both the residents and the local governments.

For Florida, there are double barrel bonds carrying Florida's credit rating in addition to the SRF program. No interest rate subsidy; lower cost to issue and available to all kinds of pollution control facilities.

- **Additional methods**: These include the following:

1. *Fees*

   Fees are one of the most widely used sources of funding. User fee systems that equitably charge residential, commercial, and industrial users have been a requirement of the federal construction grant program and the SRF program. In addition, wastewater utilities structured as enterprises funds require dedicated revenue sources; in most cases user fees, to pay for both capital and operating costs.

2. *Miscellaneous*

   The miscellaneous funding sources include several options: proffers, capacity credits, and fines and penalties. Proffers are generally defined as contributions of land, services, or facilities from private sector development companies. Capacity credits are rights to connect to a

water/sewer system in the future. Fees charged to developers to access services may be used to fund construction on additional treatment capacity or controls. The most significant limitation for these sources is that it is difficult to predict.

The following table, supplied by the EPA, shows the various methods that can be taken to fund the treatment and repair of the systems.

Table 18. Summary of Estimated Capital and Operation and Maintenance Costs for OWTSs (adapted from Hoover, 1997)

	Costs (dollars)					
	Total materials & installation	Present value of total O&M	Total over life of system	Amortized Monthly materials & installation	Average monthly present value of O&M	Average monthly over the life of the system
Septic Tank and Gravity Distribution						
Alone	2,504	6,845	9,349	20	19	39
With Chambers	3,336	7,032	10,368	27	20	46
With Styrene foam	2,846	6,920	9,767	23	19	42
With large diameter pipes	3,816	7,156	10,971	31	20	51
With pressure manifold	4,774	7,707	12,482	38	21	60
With pressure manifold and chambers	5,593	7,889	19,482	45	22	67
With pressure manifold and styrene foam	5,103	7,777	12,881	41	22	63
With pressure manifold large-diameter pipes	6,073	8,013	14,085	49	22	71
With sand filter pretreatment	7,296	12,069	19,364	59	34	92
With peat filter pretreatment	11,808	12,604	24,412	95	35	150
With recirculating sand filter pretreatment	6,226	12,059	18,285	50	33	84
With wetland cell	5,574	23,231	28,805	45	65	109
With 18" fill mound	4,507	6,850	11,357	36	19	55
With 18" fill mound and chambers	5,326	7,032	12,357	43	20	62
Septic Tank and LPP Distribution						
Alone	4,523	12,319	16,843	36	34	71
With sand filter pretreatment	10,223	13,338	23,561	82	37	119
With recirculating sand filter pretreatment	8,232	13,007	21,239	66	36	102
In at-grade system	4,590	12,345	16,935	37	34	71
Septic Tank and Drip Distribution						
Alone	11,163	13,082	24,245	90	36	126

Table 19. Summary of Estimated Capital and Operation and Maintenance Costs for OWTSs (adapted from Hoover, 1997) (Continued)

	Costs (dollars)					
	Total materials & installation	Present value of total O&M	Total over life of system	Amortized Monthly materials & installation	Average monthly present value of O& M	Average monthly over the life of the system
With sand filter pretreatment	15,994	14,101	30,095	129	39	168
With recirculating sand filter pretreatment	14,872	14,094	28,966	120	39	159
With sand filter pretreatment and chlorine disinfection	16,408	21,244	37,652	132	59	191
With recirculating sand filter pretreatment and chlorine disinfection	15,285	21,237	36,522	123	59	182
With sand filter pretreatment and UV disinfection	17,867	21,655	39,522	144	60	204
With recirculating sand filter pretreatment and UV disinfection	16,744	21,757	38,501	135	60	195
Septic Tank and Gravity Distribution						
Alone	2,504	6,845	9,349	20	19	39
With Chambers	3,336	7,032	10,368	27	20	46
Septic Tank and Spray Irrigation						
With sand filter pretreatment and chlorine disinfection	11,890	20,670	32,580	96	57	153
With recirculating sand filter pretreatment and chlorination	10,768	20,663	31,431	87	57	144
With sand filter pretreatment and UV	13,349	21,190	34,539	107	59	166
With recirculating sand filter pretreatment and UV	12,227	21,183	33,410	98	59	157
Denitrification System Black Water and Gray Water Separation						
With gravity distribution	9,963	13,508	23,471	80	38	118
With LPP distribution	12,565	15,070	27,635	101	42	143
Other Type						
Aerobic treatment unit and gravity distribution	8,037	36,406	44,443	65	101	166
Septic tank and pressure-dosed sand mound system	4,863	12,407	17,269	39	34	74
Septic tank filter or screen (installation or retrofit into existing tank only)	200-400	938	1,250	1	<1	<1

Source: EPA. Tables

VIII. Technical Options

- Treatment Technologies Available
- Media Filters (sand, peat, textile)
- Aerobic Treatment Units (ATUs)
- Lagoons
- Evapotranspiration Beds (ET Beds)
- Individual Wetlands
- UV Disinfection
- Others

Dispersal Technologies:

- Septic Tank Effluent Pumping
- Low Pressure Pipe
- Mounds (Figure 6).
- Drip Irrigation. (Figure 7).
- Chamber System (Figure 8).
- Contour Trench (Figure 9).
- Pressure Dosing

Figure 3. Mounds

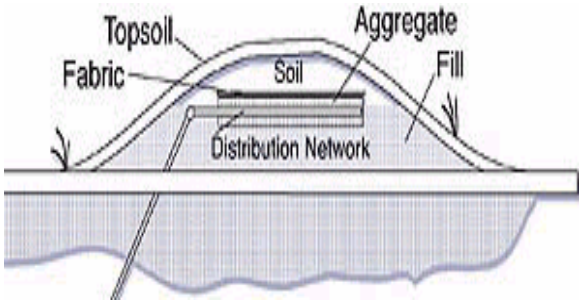


Figure 4. Drip Irrigation

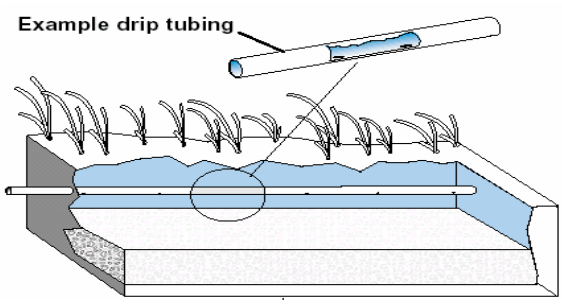
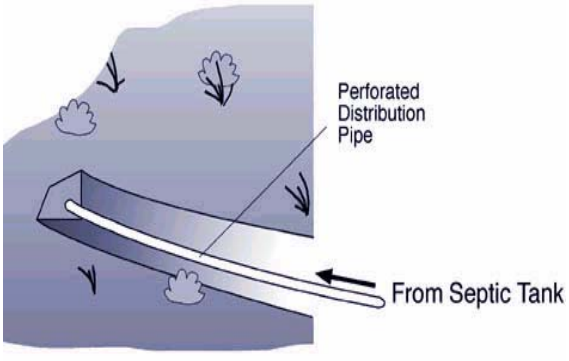


Figure 5. Chamber System

Figure 6. Contour Trench



Figures

Examples of advanced treatment technology:

- Effluent Pumping (Figure 10).
- Textile Filter (Figure 11).
- Intermittent Sand Filter (Figure 12).
- Recirculating Sand Filter (Figure 13).

Figure 7. Effluent Pumping

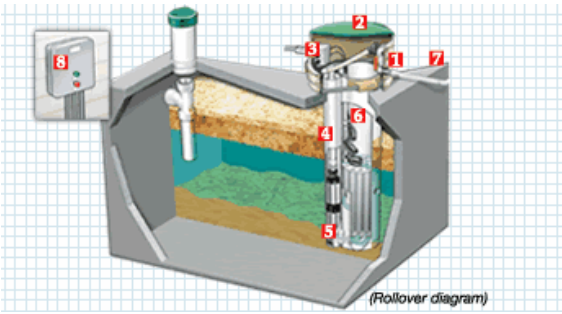
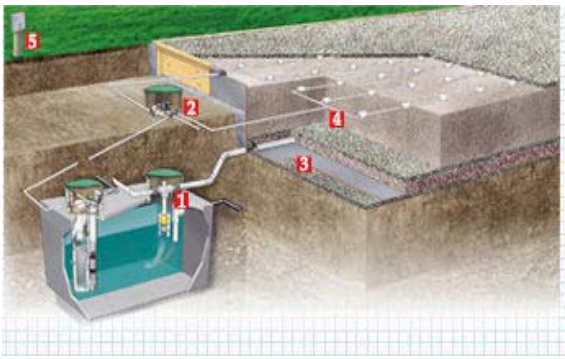


Figure 8. Textile Filter

Figure 9. Intermittent Sand Filter

Figure 10. Recirculating Sand Filter



Figures In Florida, there are currently a number of performance-based systems that have been approved. Table X depicts those systems currently approved and their associate testing methods as of October 2006.

Table 19. Performance Data for Components On Performance-Based Treatment Systems that Have Nutrient Data On File With the Bureau of Onsite Sewage Programs as of Oct. 2006[10]

Component/ Configuration	Type of testing	CBOD5 (mg/L)		TSS (mg/L)		TN (mg/L)		TP (mg/L)		Vendor	Vendor Contact Phone	Vendor web-site	Innovative Status
		in	out	in	out								
Advantex 20x	NSF-40	162	5	291	4					Orenco Systems	1-800-348-9843	http://www.orenco.com/	Yes
Advantex 20x Mode 1	N-testing concurrently with NSF-40	166	5	292	4	33	12			Orenco Systems	1-800-348-9843	www.orenco.com/	Yes
Advantex 20x Mode 3	N-testing after NSF40	112	7	170	9	34	10			Orenco Systems	1-800-348-9843	www.orenco.com/	Yes
Aerocell ATS SCAT8-AC-C500	NSF-40+Nitrogen	240	2	290	2	40	9.3			Quanics	1-877-quanics	www.quanics.net/	Yes
EcoPure 300	Innovative in Florida (n=25/9 of 1 system)	327	7.7	421	6.2	58	31	11	5.1	Eco-Pure Wastewater Systems	1-888-999-0936	www.eco-purewastewatersystems.com	Passed
EnviroFilter C	Innovative in Florida (n=19/18 of 4 systems)		9.8		6.0		21.9		6.4	Earthtek Environmental Systems	1-904-381-0405		Passed
HOOT 500 AND	N-testing (25 samples) with NSF-40	196.1	2.2	194.3	1.5	26.3	9.6	8.8	3.1	Hoot Aerobic Systems	(337) 474-2804	www.hootsystems.com	Passed
MICRO-FAST	Keys Study, Phase I (12 samples)	138	2.6	117	4.63	38	11	8.4	5.4	Bio-Microbics	1-800-753-3278	www.biomicrobics.com	Passed
MICRO-FAST	Keys Study, Phase II (n=13/ 14)	110	1.2	92.	3.9	48	11.5	8.7	6.6	Bio-Microbics	1-800-753-3278	www.biomicrobics.com	Passed
MICRO-FAST	NSF-40+Nitrogen		9		7	61.4	13.3			Bio-Microbics	1-800-753-3278	www.biomicrobics.com	Passed
RETROFAST 0.375	ETV	150	12	180	28	39	19			Bio-Microbics	1-800-753-3278	www.biomicrobics.com	Yes
Septitech Model 400	ETV	250	5.4	150	3	39	14			Septitech	(207)657-5252	www.septitech.com	Yes
Singulair 960 w/ Biokinetics	NSF-40	184	6	238	10					Norweco	419-668-4471	www.norweco.com/html/main.htm	?
Singulair 960 w/ Biokinetics phase 1 w/ recirc	16 N-tests at NSF testing facility	167		226		25	6.8			Norweco	419-668-4471	www.norweco.com/html/main.htm	?
Singulair 960 w/ Biokinetics phase2 no recirc	8 N-tests at NSF testing facility	167		226		25	11.8			Norweco	419-668-4471	www.norweco.com/html/main.htm	?
ZeroImpact	Innovative in Florida (n=33/29 of 5 systems)		10.49		16.63		23		1.4	Biotech Systems LLC	352-376-8016	www.biofilter.com	Yes

EPA. 2006. **Tables**

The table summarizes testing results for treatment components that might be used as part of a performance-based treatment system designed by engineers. These components are intended by their manufacturers to achieve oxidation of wastewater and concurrent removal of CBOD5, TSS, and reductions of nitrogen and/or phosphorus in the effluent.

[10] Data provided by Dr. Eberhard Roeder, P.E., Bureau of Onsite Sewage Programs, Florida Department of Health

IX. Education & Outreach Options

Education regarding onsite wastewater systems is relatively abundant – it is merely a matter of whether or not the people involved are spreading the information and those that need to read it are willing and able to do so. One brochure, included in Appendix X, will be distributed (November 2006) to the homeowners of Wakulla County regarding performance based treatment systems. It's critical for homeowners to understand how to properly use their performance based septic system, and to become knowledgeable that each homeowners actions have repercussions with respect to the environment.

The general questions the public want to know are:

- How much will it cost the community and the individual?
- Will the changes mean more development in the neighborhood? If so, how much?
- Will the Changes prevent development?
- Will the changes protect the resources?
- How do the proposed management alternatives related to the above questions?

Here is the list of main resources of knowledge of on-site sewer system provided by different institutes around the country:

Table 20. Lists of Education Sources

Institute	Website	Education Methods
U.S. Environmental Protection Agency (EPA)	www.epa.gov/owm/onsite	Homeowners - Information to help homeowners understand the function and maintenance of their septic system. Homeowner's Guide to Septic Systems; Homeowner Septic System Checklist
		State and Local Government Officials - Information on developing septic system management programs, funding sources, and new technologies.
		Industry Professionals - Information on septic system technologies and educating your customers.
		Where You Live - Provides contacts, links to state regulations and requirements, and other useful information about septic systems.
National Small Flows Clearinghouse	www.nesc.wvu.edu	Regulations Repository
		Septic System Info.
		Small System Security
		Discussion Group
		Links
Rural Community Assistance Program	www.rcap.org	Public education through speaking at meetings on infrastructure, water resources, solid waste, and related issues, and also through publications including Rural Matters.
National Onsite wastewater Recycling Association, Inc.	www.nowra.org	Homeowners Onsite System Guide & Record Keeping Folder Technical Education Program
Septic Yellow page	www.septicyellowpages.com	The Septic Yellow Pages provides listings by state for professional septic pumpers, installers, inspectors, and tank manufacturers throughout the United States. This Web site is designed to answer simple septic system questions and put homeowners in contact with local septic system professionals.
National Association of Wastewater Transporter	www.nawt.org	NAWT Training Sessions

Tables

A public outreach and education program should make information as accessible as possible to the public by presenting the information in a non-technical format. Onsite management entities should also promote and support the formation of citizen advisory groups composed of community members to build or enhance public involvement in the management program.

Public outreach and education programs use various media options available for information dissemination:

- Newspaper
- Radio/TV
- Speeches and presentations
- Exhibits and demonstrations
- Conferences and workshops
- Public meetings
- School programs
- Local and community newsletters
- Reports
- Direct mailings

There are the outreach opportunities and other events attended in the sample case of DEP Purchase Order S 3700 210902 for coordination of Silver Springs Working Group between August 2004 and June 2005.

1. Marion Springs Festival September 24th and 25th.
2. Green Horses, Clean Water forum October 23rd and 24th.
2. Spring Task Force meetings December 2004 and April 2005.
3. Presentation to Silver Springs Rotary Club, March 2005.
4. Presentation at Druid Hills Methodist Church, February 2005.
5. Public Environmental Interest Conference at University of Florida Law School, presentation on proposed legislation, February 2005.
6. 'Solving Pollution Problems in the Wakulla Springshed', a symposium hosted by 1000 Friends of Florida in May 2005.
7. Workshop on springshed delineation at University of Florida, March 2005.
8. Poster presentation on springs working groups at American Water Works Source Water Protection Symposium, January 2005.

Table 21. Septic System Dos and Don'ts (adapted from National Small Flows Clearinghouse):

Dos	Don'ts
• Check with the local regulatory agency or inspector/pumper if have a garbage disposal units to make sure that the septic system can handle the additional waste.	• The septic system is not a trashcan.
• Check with the local health department before using additives. Commercial septic tank additives do not eliminate the need for periodic pumping and can be harmful to the system.	• Don't use caustic drain openers for a clogged drain. Instead, use boiling water or a drain snake to open clogs.
• Use water efficiently to avoid overloading the septic system. Be sure to repair leaky faucets or toilets.	• Don't drive or park vehicles on any part of the septic system.
• Use commercial bathroom cleaners and laundry detergents in moderation.	
• Check with the local regulatory agency or inspector/pumper before allowing water softener backwash to enter the septic tank.	
• Keep records of repairs, pumpings, inspections, permits issued and other system maintenance activities.	
• Learn the location of the septic system.	
• Have the septic system inspected at least every 3 years and pumped periodically by licensed inspector/contractor.	
• Plant only grass over and near the septic system. Roots from nearby trees or shrubs might clog and damage the drainfield.	

Tables

X. Ordinances for OSTDS

Recently, in September 2006, Wakulla County adopted a water quality ordinance (see below) that addressed future changes regarding septic systems. In summary, all new developments will be required to install PBTS, and any new repair will require a new PBTS replacement. The policy implementation procedures need to still be written to provide some guidance as to how agencies and residents will best manage the PBTS. Attached is the Franklin County Ordinance for OSTDS in Appendix X.

Wakulla County Water Quality Ordinance - Future Land Use Element

Policy 1.5: Land development regulations shall contain performance standards which:

(1) Address buffering and open space requirements;

(2) Address historically significantly properties meriting protection; ~~and~~

(3) Address the protection of springs, springsheds, groundwater, drinking water; and

(4) Address protection of wildlife, recharge, and water quality in 100-year floodplains, sinkholes, wetlands and important upland habitats.

Policy 7.5: All development in areas without central sewer services shall be governed by the provisions of Section 3 81 .272, F.S., regulating on-site sewage disposal systems; and, Rule 10D-6, F.A.C., which regulates the installation of individual sewage disposal facilities, unless otherwise specified. For all new construction, only performance-based septic systems that can produce a treatment standard of 10 milligrams per liter of nitrogen shall be installed, pursuant to Infrastructure Policy 1.3.1.

Objective 13: Protect Wakulla County's springs and waters through the implementation of the following policies.

Policy 13.1: Development shall meet the following design standards:

a. Except as otherwise provided, development shall be buffered from the following karst features as shown below.

Table 22. Karst features

Feature	Minimum buffer (feet)
• 1st & 2nd Magnitude Springs	300
• Spring runs	150
• Smaller springs	100
• Sinkholes, with a direct connection to the aquifer	100
• Other karst features with a direct connection to the aquifer (swallet or stream to sink)	100

Tables

b. The buffer shall be measured from the rim of the sinkhole or karst feature; ordinary high water line for fresh water springs and spring runs; or mean high water line for tidally controlled springs and spring runs;

c. The buffer required in (b) above shall retain natural vegetation within the buffer area, except for minimal removal to allow uses such as docks or boardwalks for which mitigation is required;

d. Non-residential development shall use joint or shared access and shared parking to the maximum extent feasible in order to minimize impervious surfaces. Any parking lots with more than 50 spaces shall be designed with a minimum of twenty (20) percent of the parking spaces in pervious area;

e. Design of parking lots, sidewalks, buildings, and other impervious surfaces shall minimize connections between impervious surfaces, through techniques such as:

- Directing flows from roof drains to vegetated areas or rain barrels or cisterns for reuse;
- Directing flows from paved areas to vegetated areas;
- Locating impervious surfaces so that they drain to vegetated buffers or natural areas; and
- Breaking up flow directions from large paved surfaces.

f. Porous pavement materials, pervious concrete, and pervious asphalt may be used to minimize the amount of impervious surface within new development and redevelopment.

g. Definitions:

1) **Spring** - A point were underground water emerges onto the Earth's surface. For this reason the County does not consider a karst window to be a spring.

2) **1st magnitude spring** – A spring category based on the volume of flow per unit of time greater than 100 cubic feet per second or 64.6 million gallons per day.

3) **2nd magnitude spring** – A spring category based on the volume of flow per unit of time from 10 to 100 cubic feet per second or 6.46 to 64.6 million gallons per day.

4) **Smaller spring** - A spring with a volume of flow smaller than 6.46 million gallons per day.

5) **Spring run** - A body of flowing water that originates from a karst spring whose primary (> 50 %) source of water is from a spring, springs, or spring group.

NOTE: For example, the Wakulla River, where the predominate source of water is from Wakulla Springs, is a spring run. However, farther downstream, where surface water tributaries and drainage contribute 50 % or greater of the flow, the Wakulla River is no longer considered a spring run. A detailed hydrogeologic study may be necessary to identify boundaries of a spring run vs. river or stream.

6) **Sinkhole** – A landform created by subsidence of soil, sediment or rock as underlying strata are dissolved by ground water.

NOTE: sinkholes may be directly (karst window) or indirectly connected to the aquifer or disconnected by the presence of a confining layer of soil or rock (clay) that no longer allows water to permeate below this layer. The later may be expressed as a relic sinkhole or lake, depression in the land surface, or loose soils in the subsurface.

7) **Swallet or swallow hole** – A place where water disappears underground in a limestone region. A swallow hole generally implies water loss in a closed depression or sinkhole, whereas a swallet may refer to water loss from a disappearing stream or streambed, even though there is no depression.

8) **Karst features -** A term describing landforms that have been modified by dissolution of soluble rock (limestone or dolostone). These include springs, spring runs, sink holes, and swallets or swallow holes

9) **Recharge Area** - The area where water predominantly flows downward through the unsaturated zone to become groundwater. (source: Univ. of Nebraska-School of Natural Resources)

Policy 13.2: Where a lot of record is too small to accommodate development in compliance with the buffers set forth in Policy 13.1, reasonable use shall be established provided that the building and associated paved areas are located as far away from the karst features identified in Policy 13.1 as possible and further provided that a natural vegetated swale and~~/or~~ berm are located between the development and the karst feature. The vegetated swale and~~/ or~~ berm shall be designed to direct drainage away from the karst feature. A P.U.D. application must be used for any multi-unit development on a lot of record.

Policy 13.3 The county may provide an alternative buffer to those established in Policies 13.1 ~~and~~ or 13.2 if the size, geological conditions and design of a proposed development (clustering) allow attainment of a level of groundwater protection equivalent to that produced by the design standards of Policy 13.1 or 13.2 respectively, where the following conditions are met:

A. The proposed development is processed as a Planned Unit Development; and

B. As part of the P.U.D. process, the applicant agrees to reimburse the county for its costs in employing a licensed Professional Geologist to make necessary measurements, analyze data, define an alternative buffer and provide a written report that includes a professional opinion that the proposed alternative buffer will provide a level of groundwater

protection equivalent to that expected from the design standards of policy 13.1 or 13.2 respectively. Except for lots of record, an alternative buffer shall not be less than 50 feet. ~~the county shall impose a fee to hire a third party consultant with expertise in nitrate loading who shall examine the proposal and verify in writing that the alternative buffer is sufficient to protect against a significant measurable net increase in nitrate loading to ground water.~~

Policy 13.4: In order to minimize the contribution of nitrates to groundwater with its resultant effects on increased growth of vegetation in the springs, rivers and coastal waters, and loss of water clarity, and to foster long-term stewardship, special design and best management practices (BMPs) as set forth in policies 13.5 through 13.12 shall be instituted for all proposed development.

Policy 13.5: Proposed amendments to the Future Land Use Map (FLUM) shall meet the following criteria:

a. Demonstrate that the proposed uses will be developed consistent with conservation, best management practices or clustering design techniques; and

b. Demonstrate that there will be no concentration or storage of hazardous materials without secondary containment.

Policy 13.6: The minimum open space ratio for all development within Rural 1, Rural 2 and Rural 3 land use categories, shall be twenty (20) percent. All open space shall be contiguous with existing open space on adjacent parcels to the maximum extent feasible.

Policy 13.7: Drainage for streets and roads shall be provided through roadside swales and berms. Curb and gutter design shall be discouraged unless beneficial for removal and treatment of stormwater.

Policy 13.8: The following information is required prior to any new

development in excess of one acre to evaluate the vulnerability of the development sites to leaching of nitrates into groundwater and subsequent transmission to surface waters:

a. An analysis of the site to determine the location and nature of potential karst features identified in Policy 13.1 on the property that may have direct connections to the aquifer;

b. If site analysis determines a likelihood of direct connection to the aquifer, a geophysical analyses shall determine the depth of the water table and thickness and extent of protective clay layers over the aquifer; and

c. If the geophysical analysis confirms a direct connection to the aquifer, a comparative nitrate loading analysis for the proposed development shall be prepared and certified by a licensed professional geologist using professionally acceptable methodology based on the existing land use designation at the time of this amendment versus the proposed land use activity at build-out. The analysis shall take into account specific on-site best management practices and compensatory reduction off-site through the expansion of central sanitary sewer and/or storm-water facility. The analysis must demonstrate, with all factors taken into account, that there is no significant measurable net increase in nitrate loading to groundwater. The comparative nitrate loading study submitted as data and analysis as part of the comprehensive plan amendment shall be deemed to meet this requirement.

Policy 13.9: All development shall require best management practices as dictated by the principles and practices of the Florida Yards and Neighborhood Program and incorporate these practices into development orders and covenants and restrictions for subdivisions.

Policy 13.10: Landscaping standards shall encourage plant materials to be native or naturalized species in order to avoid or minimize the use of irrigation and fertilizers. Landscaping standards should also encourage retention of

existing native species rather than planting new vegetation.

Policy 13.11: Within one year from the effective date of this plan amendment, Wakulla County shall establish guidelines for managing existing and future lawns and landscapes at all public facilities using the educational guidelines contained in the University of Florida Extension's Florida Yards and Neighborhoods Program, Environmental Landscape Management (ELM) Principles and Best Management Practices. Such guidelines shall include practices that are designed to reduce nitrate infiltration into ground and surface water.

Policy 13.12: Minimize site disturbance by limiting clearing to the minimum area necessary to practically accomplish development allowed under the existing land use designation. This will minimize the removal of existing trees and native vegetation and minimize soil compaction by delineating the smallest disturbance area feasible

Conservation Element

Policy 2.3: The County will not approve development which allows storm-water discharge to flow into a wetland, river, spring, spring run, or_other body of water, or into a freshwater_fishery, bay, lake or other marine habitat or sinkhole or other karst feature connected to the aquifer without sufficient prior treatment to protect the receiving waters from degradation below applicable state water quality standards including state anti-degradation standards.

. . . . . .

(3) The County shall also protect the natural function of all surface waters through land development regulations which shall provide that proposed site plans and planned unit developments shall be submitted for review by FDEP to determine if there are impacts from the development on the natural function of surface waters. Where adverse impacts are identified, uses and the related disturbed areas on the site shall be arranged to minimize such impacts. In addition, a buffer area of seventy-five feet shall consist of two (2) bands; (one) thirty-five (35) feet in width and (two) forty (40) feet in width. The seventy-five (75) foot buffer area is generally considered a conservation or preservation area. The 35-

foot band is a "no development area" that shall be left in its natural topographic and vegetative state. The second area (40 foot band) shall be restricted to residential development consisting of a dwelling unit where the site is so constrained as to constitute a taking if no development within the 75-foot buffer area is allowed. However, use of septic systems shall be limited to areas outside of the 75-foot buffer area. The buffer shall be maintained around active sinkholes (a hollow in a limestone region that communicates with a cavern or passage to the aquifer system, but excluding shallow depressions, swampy areas, or similar low lying natural depressions), wetlands, beaches, and dunes, natural freshwater or saltwater bodies, perennial streams and each of the four outstanding water ways, except for the springs, sink hole and karst features designated in Policy 13.1.a., for which different buffers ~~may~~ shall apply. Buffer areas shall consist of maintenance of existing grade and native vegetation. Where buffer area development is permitted under other policies, conditions of approval shall be included to limit disturbance of vegetation and grade. Said standards shall be established in the land development codes.

Policy 2.4: The existing land development codes shall provide the minimum development standards and shall be reviewed periodically for consistency with the Plan. The County shall adopt and implement a comprehensive stormwater management ordinance establishing the following:

. . . . . .

(g) Special design and performance criteria for stormwater systems constructed in high recharge, or karst topographic areas (which may be patterned after those developed by the ~~SFWMD~~ SWFWMD and SJRWMD).

. . . . . .

Policy 2.6: The County shall amend its land development codes to require review of proposed site plans and planned unit developments and the evaluation of the effects of land development activities on the natural functions of fresh water fisheries, bays, lakes, springs, spring

runs, karst features connected to the aquifer, beaches, shores and marine habitats, floodways and wetlands. Where adverse impacts are noted, uses and disturbed areas on the site shall be arranged so as to minimize impact on such areas. Site plan review shall be required for any development directly contiguous to or involving disturbance of floodways, wetlands, a freshwater or saltwater body, beach, dune, springs, spring runs, or karst features connected to the aquifer.

. . . . .

Policy 5.4. The County shall protect water quality through the regulation of activities known to adversely affect the quality and quantity of identified water sources such as storage and handling of hazardous and toxic materials without secondary containment, continuation of abandoned wells, operation of un-permitted landfills. Water sources to be protected shall include existing identified cones of influence, water recharge areas, and water-wells. The County will also prohibit discharges of pollutants, as defined by the Department of Environmental Protection, into sinkholes.

OBJECTIVE 6.0: The County shall prepare and adopt a Water Management Conservation Plan, which will include retention of groundwater to protect the coastal bays and springsheds, and assure emergency water conservation in the case of ground water contamination and a wastewater reuse plan. Additionally, as grant funded studies indicate, the land development codes shall be revised and expanded to include natural water flows to receiving estuarine bodies and shall include the following measures to regulate the existing and projected allowable water quality and quantity such that no net quantity increase or quality decrease will be allowed through mandated project review criteria in the amended land development codes.

…..

Policy 6.5.: The use of landscaping best management practices as stated in the *Guidelines for Model Ordinance Language for Protection of Water Quality and Quantity Using Florida Friendly Lawns and Landscapes.* (Florida Department of Environmental Protection, September 2, 2003) is encouraged.

Policy 6.6: All golf course siting, design, construction, and management shall implement the prevention, management, and monitoring practices, detailed in the golf course siting, design, and management chapter of the P*rotecting Florida's Springs Manual – Land Use Planning Strategies and Best Management Practices (November 2002).* These practices are derived from the Audubon International Signature program.

. . . . .

Intergovernmental Coordination Element

Objective 1.2: The county will seek to coordinate springs and karst protection policies and programs with Leon County, the City of Tallahassee, the Department of Community Affairs, the Northwest Florida Water Management District, and the Florida Department of Environmental Protection to ensure a consistent approach to springs, springshed, and aquifer protection by implementing Policies 1.2.1-2 below.

Policy 1.2.1: Propose joint strategies for springs and karst protection to be implemented by all local governments within the designated springshed for Wakulla Springs and Springs Creek Springs. Proposed strategies shall be contained in an interlocal agreement that specifies responsibilities for land development regulation, stormwater management, and other matters that impact the springs and springshed.

Policy 1.2.2: Propose joint strategies for protection of water resources through water supply planning, specifically addressing identification and use of alternative water sources.

OBJECTIVE 1.3: Within one year of the effective date of this plan amendment, the county will implement mandatory requirements for inspections, operations and maintenance of on-site wastewater treatment systems.

Policy 1.3.1: Use of on-site wastewater treatment systems shall be limited to the following conditions:

a. Existing septic tank and package treatment plants may remain in service until such time as centralized service is made available, or the systems fail to properly perform;

b. The County shall amend its land development regulations within one year of the effective date of this plan amendment to provide that existing septic systems shall be replaced with performance-based septic systems when the existing system fails or otherwise requires replacement, as determined by the Department of Health. As part of such land development regulations, the County will provide an exception from the requirement of replacing a system with a performance-based septic system if the system's owner has demonstrated a financial hardship to the satisfaction of the County, that the user cannot afford to upgrade the system without public funding. The County shall define the financial hardship test by resolution. If such a demonstration is made, the system's owner must replace the system but a performance-based septic system shall not be required until sources of funding are available to assist those owners who cannot afford to pay for the upgrade;

   The County shall diligently seek sources of funding through the SHIP program and other sources, to assist those who cannot afford to upgrade failed systems as required.

c. Septic systems for new development shall be limited to performance-based septic systems as certified by the Department of Health;

d. All existing and new septic systems shall be inspected every three years by a licensed septic system contractor for maintenance or upgrade, and

e. Use of package treatment plants shall be limited to those with

business and management plans approved by the County.

Policy 1.3.2: The Public Works Department shall develop and implement inspection, operation and maintenance guidelines for package treatment plants, utilizing private sector sources for implementation whenever possible. The Public Works Department may perform such functions through contractual agreement with facility owners.

. . . . .

Policy 1.3.5: All development shall connect to central wastewater treatment facilities within ~~three~~ one year~~s~~ from the date that such facilities are available or become available as provided by law. The standards for treatment are:

a. Advanced Wastewater Treatment (AWT) levels (3mg/L for nitrogen, 5 mg/L CBOD, 1 mg/L total phosphate, 5 mg/L suspended solids, & a high level of disinfectant) for all Type I (design capacity of 500,000 gallons per day to 12.5 million gallons per day) and Type II (100,000 to 500,000 gallons per day) central wastewater treatment facilities using Rapid infiltration Basins.

b. A treatment standard above secondary treatment of 10 mg/L for nitrogen for Type III (less than 100,000 gallons per day) facilities.

....

OBJECTIVE 2.5: The County will revise its land development regulations to incorporate regulations protecting the functions of groundwater recharge areas, springs, and springsheds.

Policy 2.5.1: New development will be required to maintain surface and groundwater flow rates and volumes at pre-development levels so that the natural function of groundwater recharge areas is maintained.

Policy 2.5.2: Substantial redevelopment projects shall comply with the standards for stormwater runoff that apply to new development. Substantial redevelopment shall be based upon the value and amount of cumulative improvements to the site, as provided by the land development regulations.

Policy 2.5.3: Best management practices shall be used in combination as part of a BMP treatment plan to protect water quality and minimize flooding.

BMPs shall be used in the design of stormwater management facilities and systems. The following stormwater BMPs shall be instituted to reduce nitrate loading:

a. All residential subdivisions shall use vegetated swales with swale blocks or raised driveway culverts whenever possible, except when soil, topography, or seasonal high water conditions are inappropriate for infiltration as determined by a professional engineer licensed in the State of Florida.

b. Vegetated infiltration areas shall be used to provide stormwater treatment and management on all sites except when soil, topography, or seasonal high water conditions are inappropriate for infiltration as determined by a professional engineer licensed in the State of Florida. Design of the stormwater systems for residential and commercial uses shall use bio-retention areas (below grade vegetated areas) to increase stormwater treatment and reduce stormwater volume. Downspouts for both residential and commercial development shall be directed from the roof to vegetated areas for uptake.

c. Whenever infiltration systems are not feasible, wet detention systems shall be used for stormwater treatment and management.

d. Developments shall utilize the St. Johns River Water Management District karst sensitive criteria found in SJRWMD Rule 40C-41.063 (7)(a) ERPS – Surface Water Management Basin Criteria and SJRWMD Rule 40C-42, Part II Criteria for Evaluation, Section 9.11 Sensitive Karst Area Basin Design Criteria.

    i. Sensitive karst features, including sinkholes with a direct connection to the aquifer and stream-to-sink features, shall not be utilized as stormwater management facilities. ~~Prior to subdivision approval, all of these features will be investigated by a licensed professional using a professionally acceptable methodology for suitability of water retention using generally accepted geo-technical practices with an emphasis on identification of potential connections to the aquifer. If connections are determined to exist, the depression shall not be used for stormwater retention and the feature shall be protected under the provisions of Future Land Use Element Objective 13.~~

    ii. All development approval by the County shall require the applicant to submit to the County a copy of the DEP stormwater permit and the NPDES notice of intent to be covered by the

construction generic permit prior to any land clearing.

e. All components of the stormwater treatment and management system shall be in common ownership and shall be maintained by the responsible legal entity identified in the DEP stormwater permit, typically a homeowner or property owners association.

f. The studies required in Future Land Use Element Policy 13.8 ~~item (d)(i) above~~ shall be used to characterize on-site soils and determine locations of geologic features including sinkholes, solution pipes, depressions, and depth of soil to lime rock. Sensitive karst features like sinkholes with a direct connection to the aquifer and stream-to-sink features shall be protected.

Policy 2.5.4: A Wastewater Facility Plan shall be developed in order to establish a comprehensive method to ensure adequate levels of wastewater collection, treatment, disposal, and reuse.

XI. Conclusions & Recommendations

Effective management is the key to ensuring that the requisite level of environmental and public health protection for any given community is achieved. It is the single most important factor in any comprehensive wastewater management program. Without effective management, even the most costly and advanced technologies will not be able to meet the goals of the community. Numerous range of wastewater treatment needs. Without proper management, however, these treatment technologies will fail to perform as designed and efforts to protect public health and the environment will be compromised.

There are 9 critical elements involved in management programs:

- Clear and specific program goals
- Public education and outreach
- Technical guidelines for site evaluation, design, construction and operation/maintenance
- Regular system inspections, maintenance, and monitoring
- Licensing or certification of all service providers
- Adequate legal authority, effective enforcement mechanisms, and compliance incentives
- Funding mechanisms
- Adequate record management
- Periodic program evaluations and revisions

Concerning Task 2, CEFA would like to make the following recommendations to Wakulla County regarding future steps with respect to the OSTDS planning process:

- Design a survey instrument and conduct a survey of the citizens (representative sample) of Wakulla County that addresses the OSTDS planning and implementation process. The questions would include such areas as: the suitability of a county or regional management utility, and its associated form; and questions where the responses could be used for the policy implementation portion of the water quality ordinance. In addition, a series of public forums/meetings would help garner additional feedback regarding the OSTDS planning and implementation stages.

- These results need to be tabulated and analyzed to present an overall summary of findings that will used as a baseline for the policy implementation stage of the water quality ordinance. As discussed in Task 1, a group of "experts" will serve as an advisory committee to assist in assessing the "sensitivity or vulnerability" areas of Wakulla County (based on soil type, hydrology, income level, etc..). This group can also serve to assist in the water quality ordinance policy implementation review stage.
- The policy implementation guidelines would be drafted and become adopted by Wakulla County.

XII. References

- FDEP. December 2004. A strategy for water quality protection: Wastewater treatment in the Wekiva Study Area.
- Florida Springs Task Force. November 2000. Florida's Springs: Strategies for Protection and Restoration.
- Florida Department of Community Affairs and FDEP. November 2002. Protecting Florida's Springs: Land Use Planning Strategies and Best Management Practices.
- Management of Single Family and Small Community Wastewater Treatment and Disposal Systems, M. T. Hoover, *Extension Soil Science Specialist* , W. J. Wicker, *Assistant Director, Institute of Government, University of North Carolina at Chapel Hill* , T. J. Hoban, *Extension Sociology Specialist* , T. A. Feitshans, *Extension Economist* , A. R. Rubin, *Extension Agricultural Engineering Specialist*
- Onsite Wastewater Treatment Systems: Five Levels of Protection, Christopher C. Obropta, Ph.D., Extension Specialist in Waste Resources & David Berry, Student in Bioresource Engineering.
- U.S. Environmental Protection Agency, EPA Guidelines for Management of Onsite/Decentralized Wastewater Systems.
- U.S. Environmental Protection Agency, EPA's Voluntary Management Guidelines: Models 1, 2 and 3.
- U.S. Environmental Protection Agency, EPA's Voluntary Management Guidelines: Models 4 and 5.
- Bureau of Onsite Sewage Programs, FL Dept. of Health, Division of Environmental Health, Septic Systems: Rumors, Rules, and Research Questions.
- U.S. Environmental Protection Agency Office of Wastewater Management, Decentralized Approaches to Wastewater Treatment.
- Bureau of Onsite Sewage Program, FL. Dept. of Health, Devision of Environmental Health. Onsite Systems, Nutrients, and the Wakulla Springshed.
- May 11-13th Workshop: "Solving Water Pollution Problems in the Wakulla Springshed of North Florida
- Association of New Jersey Environmental Commissions (ANJEC). (2002). *Septic system management for clean water*. Mendham, NJ.
- Association of New Jersey Environmental Commissions (ANJEC). (2003). *Managing septic systems to protect water quality*. Mendham, NJ.
- Township of Montgomery. (1999). *Onsite Wastewater Disposal Management District - Ordinance No. 2002-04*. Montgomery, NJ.
- On-Site Sewage Treatment Alternatives, C. Zipper, Extension specialist and associate professor, Department of Crop and Soil Environmental Sciences; R.B. Reneau Jr., professor emeritus, Department of Crop and Soil Environmental Sciences; and Anish Jantrania, technical services engineer, Virginia Department of Health; Virginia Tech
- USEPA Onsite Wasterwater Treatment Systems Manual .

XIII. Appendix A: Wakulla County OSTDS Brochure for Homeowners

How Much Does a Nitrogen-Reducing System Cost?
The cost of installing any septic system depends on the site; for example, the size of your house, how close you are to water, how much fill dirt is needed, and such. For a three-bedroom house in Wakulla County, installing a traditional septic system costs from $2,000 to $8,000. Installing a nitrogen-reducing system costs from $5,000 to $12,000. Nitrogen-reducing systems also have small monthly electricity costs. Operating permits and maintenance contracts add to the costs as well.

How Do I Get a Nitrogen-Reducing System?
The first step is to contact either a septic system installer or an engineer who works with these systems. The Wakulla County Health Department has a list of installers and engineers who work with nitrogen-reducing systems.

You may find it helpful to visit http://www.doh.state.fl.us/ENVIRONMENT/ostds/ to see a list of licensed installers. There, too, you will find general information on septic systems and nitrogen-reducing systems.

How Do I Maintain a Nitrogen-Reducing System?
The installer (or other maintenance company) will check the system 2-4 times yearly. They will get needed permits, also. The county health department will inspect your system each year. Like septic tanks, these systems should be pumped (to remove the sludge that builds up in the tank) every 3-5 years.

Where Can I Find More Information?

- Wakulla County Health Department
  48 Oak Street, Crawfordville, FL 32327
  Phone: 850-926-2558 extension 156

- Wakulla County Community Development Department (Planning Department)
  3093 Crawfordville Highway,
  Crawfordville, FL 32327
  Phone: 850-926-3695

Nitrates affect our drinking water.

"This brochure was funded by the Florida Department of Environmental Protection through a Section 319 Nonpoint Source Management Program implementation grant provided by the U.S. Environmental Protection Agency."

August 2006

Created and Designed by:
Tallahassee-Leon County Planning Department
Research & Graphics Division
300 South Adams Street, Tallahassee, Florida 32301

Beyond Septic Tanks...

...You Can Do Better!

Wakulla Springs

Algae and Hydrilla in Wakulla Springs

Wakulla County is growing rapidly. The number of septic tanks is growing, too. Septic tanks are a problem in our county. Homes here are built over a honeycomb of limestone cracks and caves (called karst).

These cracks and caves carry water and chemicals from lawns, roads, and septic tanks to the groundwater (our drinking water) and to our springs, rivers, and bays. More and more chemicals are getting into our water this way.

Nitrogen is causing the most trouble. Nitrogen is called a nutrient, because it feeds plants and makes them grow. Nitrogen is feeding the growth of water weeds and algae in places like Wakulla Springs and Apalachee Bay. Too much nitrogen in our drinking water can cause health problems, too.

Every person in our county needs to know how nutrients (such as nitrogen and phosphorus) are getting into our water – and what we can do to protect our drinking water and our springs, rivers, and bays. We are all part of the problem. We must all be part of the solution.

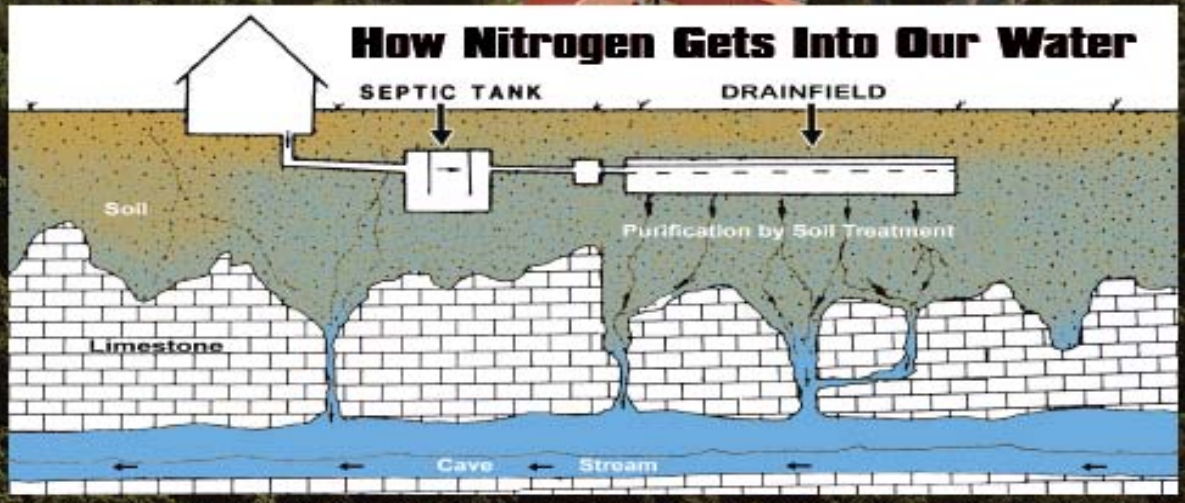
Where Does Nitrogen Come From?
Nitrogen in our water comes from many places – nitrogen in the air, sewage treatment sprayfields, fertilizers, septic tanks, pet and farm animal wastes, and stormwater runoff.

How Much Nitrogen Comes from Septic Tanks?
There are about 10,000 septic tanks in Wakulla County. Each one puts nitrogen into our water. Some newer kinds, called nitrogen-reducing systems, put a lot less nitrogen into our water.

Inside a septic tank, solids sink to the bottom and grease floats to the top of the tank. Then liquid flows out of the tank to the drainfield, carrying nitrogen with it. Some nitrogen is removed by our sandy soil as the liquid from the drainfield travels to the groundwater. Still, most (60-90%) of the nitrogen that goes into a septic tank will reach our water.

In a nitrogen-reducing system, the liquid in the tank is first mixed with air, then starved of air. This removes much of the nitrogen in the tank and turns it into harmless gas. Up to 75% of the nitrogen goes into the air (instead of the drainfield). As little as 25% gets into our water.

When Should I Replace my Septic Tank with a Nitrogen-Reducing System?
Some people are installing nitrogen-reducing systems now, because it is the right thing to do to protect our springs, bays, and drinking water. Others will install the new systems when major repairs are needed to their existing septic systems. Still others may wait until county ordinances or state laws require them to upgrade their system or connect to central sewer.



Septic systems remove only 25% of nitrogen. Nitrogen-reducing systems remove up to 75%.